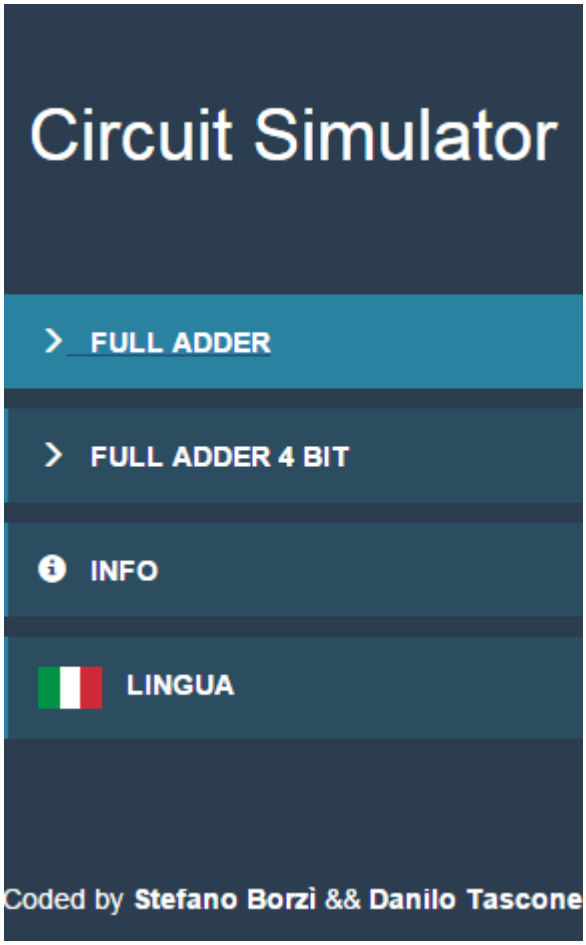
User guide

Simulators presented in this site have the goal of making easier understanding and learning logic circuits that, in their more complex version, are the “building blocks” of hardware in modern CPU. Shown examples are circuits, which performs simple operations. Learning is easier thanks to the visive and animated representation of the circuits and the possibility of seeing how they operate systematically.

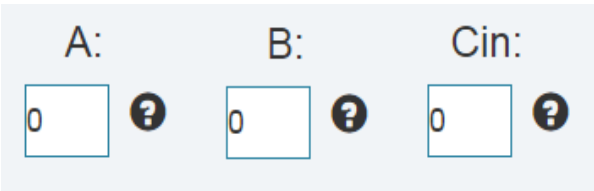
Introduction

User can use menu on the left to choose which simulator wants to visualize. By clicking on the language button it is possible switch easily from a language to another one. This site is available in two language: Italian and English.

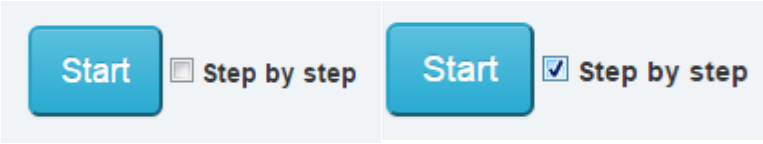


Simple full adder

This circuit is able to perform the sum between two binary digits, caring also about a hypothetical carry-in outgoing from another operation. A, B and C_{in} have the task of containing the digits which have to be summed. A and B are the operands. C_{in} is the carry-in.



The graphic simulation has two modality. The automatic mode, which takes the inputs and shows how it performs sum , and the step by step mode, which allows to “navigate” on the circuit , by focusing on each step for how long the user wants.



User just need to put the check in the predisposed square. By clicking Start, if we chase the automatic mode , the program will execute normally. If we chase step by step we will have two buttons:

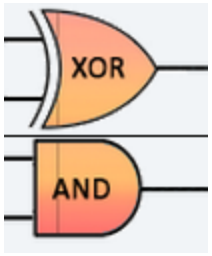
These buttons allows navigating in the simulation by going next and back.

Simbologia:

By clicking on this symbol we can access to an area on which you can find a brief explanation of the logic gates and about some circuits that are used in these simulators.

By passing with the mouse over this icon, you can visualize a little explanation on what the object does.

In the animation, numbers highlighted in green are the ones, which are being used in a certain operation.



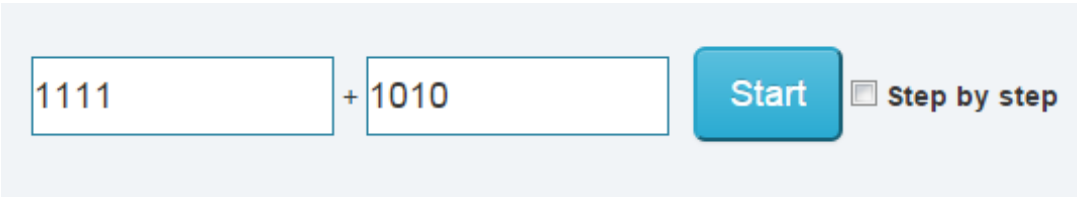
Logic doors highlighted in red are the ones that, in a certain step are active because they are performing certain operations by using the green highlighted values. The ones, which are in light blue, have to be considered inactive.

Arrows indicates the result of a given operation performed by red logic gates.

Each step has a brief description of the operation, which are being performed.

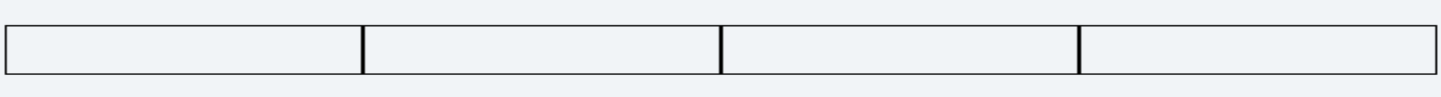
4-bit full Adder

A four-bit full adder has four in series full adder to perform the sum of two 4 bits binary numvers. In these fields, the user has to insert the values he wants to sum. Just clicking start is requested to begin the simulation.



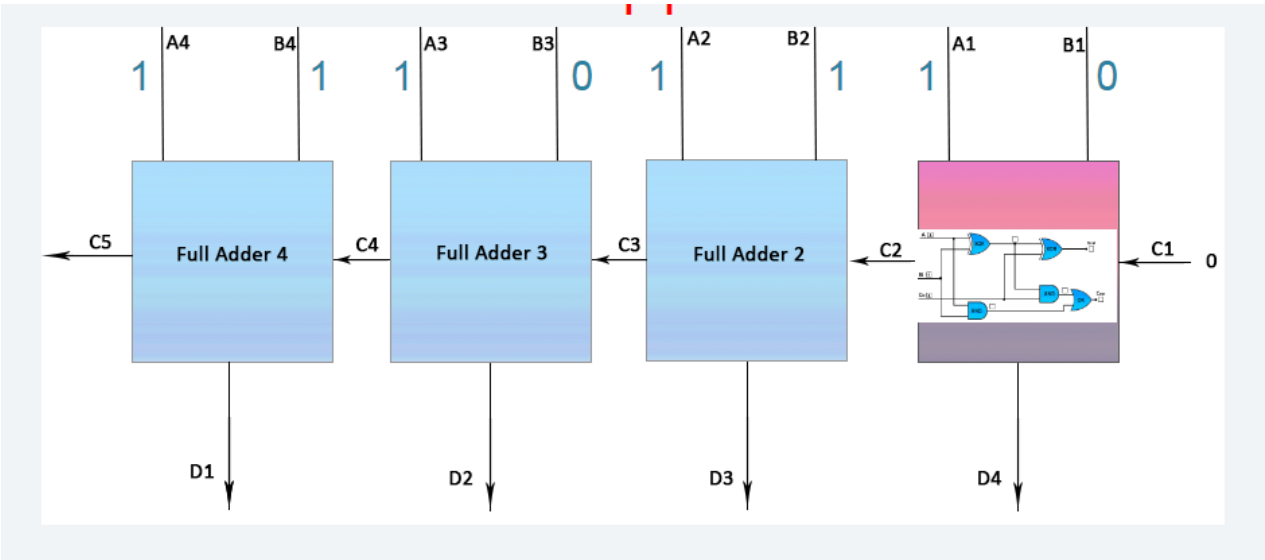
As in the simple full adder, user can choose the automatic mode or the step-by-step mode just putting the check in the box. In this case, user will have a next step and a back step button as seen previously. Inputs in full adders, A_i e B_i, are shown under its own entry.

At the end of every operation, under each picture representing a full adder user will be able to see the result of the performed operation in this zone:



At the end of the entire process result will be contained there.

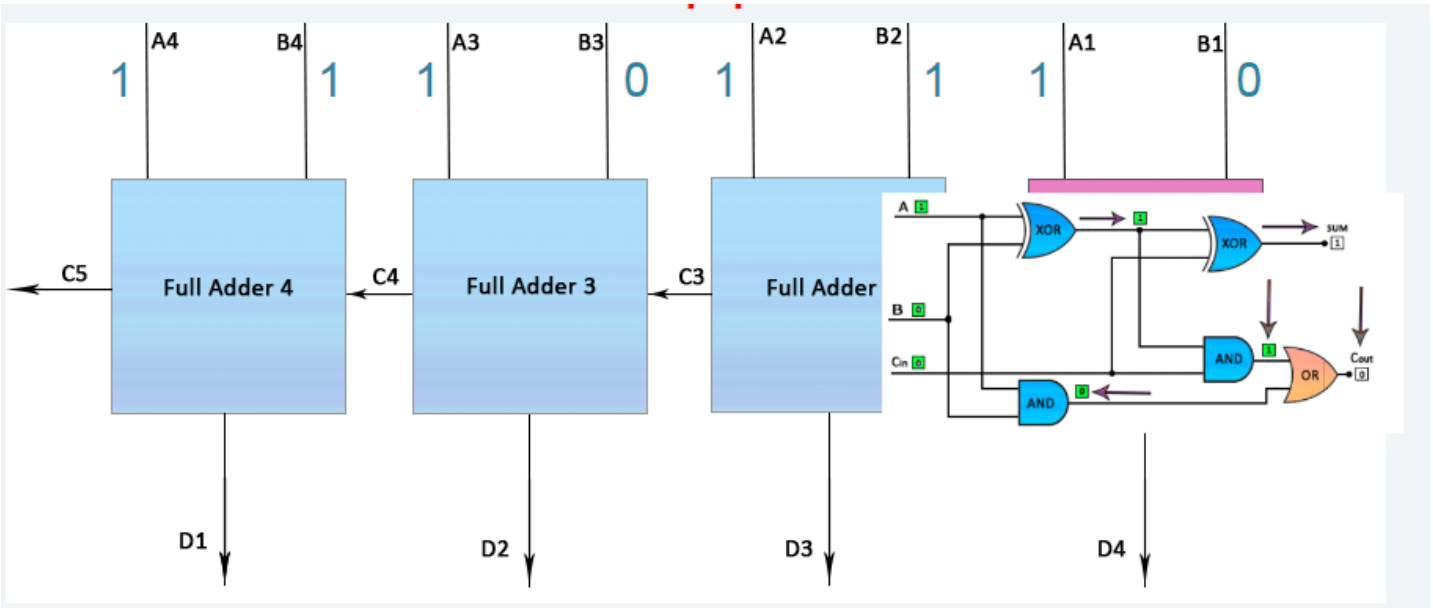
The carry-out is propagated to the next full adder. At each step, the full adder, which is performing the operation, changes its colour passing to a red coloration. It also shows the simulation of the operation which are being executed.

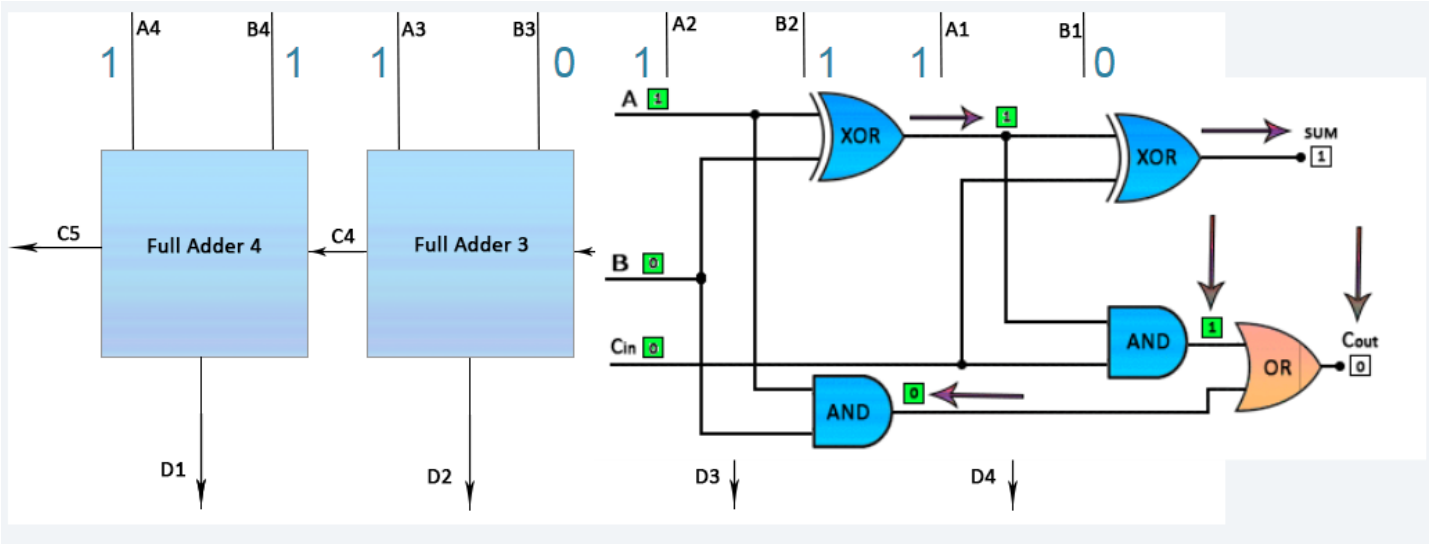


At each step, a red signal indicates which part of the 4-bit number is being processed by the full adder. The value between two red bars is the one, which is being utilized.

111|1| A
101|0| B

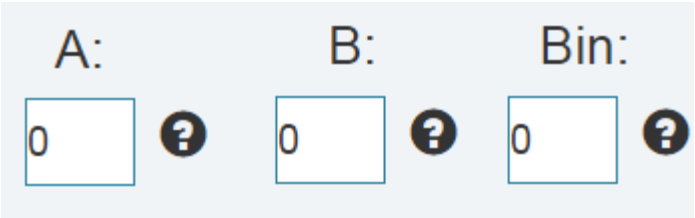
By passing the mouse over each single full adder , user can see at natural size the operation which are being performed in it.





Full subtractor

Full subtractor circuit is similar to the full adder's one in how it works. As full adder you can find an area where user can insert inputs/values. A substantial difference is the presence of a field named borrow-in(B_{in}) rather than a C_{in} since a subtraction instead of a sum is being performed.



4-bit full subtractor

It works as the 4-bit full adder. Functionalities disposed for this simulator are the same as the full adder's one. For a more detailed explanation, see the documentation above regarding 4-bit full adder.